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ENVIRONMENTAL RESTORATION PROJECT

**A Department of Energy Environmental Cleanup Program**

Environmental Restoration Project
Standard Operating Procedure

for:

# Single-Stage Sampling for Surface Water Runoff

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# Revision Log

| ***Revision (Date)*** | ***Prepared By*** | ***Description of Changes*** | ***Affected Pages*** |
|---|---|---|---|
| Enter revision number and the effective date | Enter the author's name | Enter a description of changes made | All or enter page number(s) affected |
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# Single-Stage Sampling for Surface Water Runoff

## Table of Contents

# Single-Stage Sampling for Surface Water Runoff

**Note:** Subcontractors may follow this standard operating procedure (SOP) for Single-stage sampling for surface water runoff or may use their own procedure(s) as long as the substitute meets the requirements prescribed by the Laboratory's LPR 308-00-00.1, Quality, and have been approved by the Environmental Restoration (ER) Project's Quality Program Project Leader (QPPL) before the commencement of the designated activities.

**Note:** ER Project personnel may produce paper copies of this procedure printed from the controlled-document electronic file located at http://erinternal.lanl.gov/home_links/Library_proc.shtml. However, it is their responsibility to ensure that they are trained to and utilizing the current version of this procedure. The author may be contacted if text is unclear.

## 1.0 PURPOSE

This Standard Operating Procedure (SOP) describes the methodology adopted to collect descrete samples of surface water runoff from hillsides or small ephemeral drainages at the Los Alamos National Laboratory (Laboratory) ER Project. Analysis of water and sediments in surface water runoff yields information on contaminants of potential concern (COPCs) that may be migrating from solid waste management units (SWMUs).

## 2.0 SCOPE

This SOP is a manadatory document and shall be implemented by all ER Project participants when adopting the methodology for collecting descrete samples of surface water runoff from hillsides or small ephemeral drainages for the ER Project

**Note:** Subcontractors performing work under the ER Project's quality program shall follow this SOP when adopting the methodology for collecting descrete samples of surface water runoff from hillsides or small ephemeral drainages or may use their own procedure(s) as long as the substitute meets the requirements prescribed by the ER Project Quality Management Plan, and is approved by the ER Project's Quality Program Project Leader (QPPL) before the commencement of the designated activities.

## 3.0 TRAINING

The **Field Team Leader** (FTL) is responsible for ensuring that field team members who construct, install or otherwise use single-stage samplers for the ER Project are familiar with the objectives of and properly trained in the procedures of

installation of single-stage samplers. In addition, all field team members must document at http://erinternal.lanl.gov/Training/Trainingmain.shtml that they have read and understand this procedure in accordance with QP-2.2.

## 4.0 DEFINITIONS

4.1 Single-Stage Sampler Type 1 (Siphon Samplers)— A siphon sampler is a device with a bent tube with one limb longer than the other, by means of which a liquid can be drawn off to a lower level. These samplers automatically collect a sample when the water level of a stream passes a specified elevation.

4.2 Single-Stage Sampler Type 2 (Environmental Liquid Sampler (ELS))— ELS is a mechanically operated instrument that collects a "first flush" volume of liquid without a power source. The patented instrument is able to be used in a remote setting with minimal personnel involvement.

## 5.0 BACKGROUND, PRECAUTIONS AND LIMITATIONS

**Note:** This SOP is to be used in conjunction with an approved SSHASP. Also, consult the SSHASP for information on and use of all PPE.

Single-stage samplers were developed by the U.S. Geological Survey as a simple method to obtain suspended-sediment and surface water runoff samples automatically and without immediate attention. The samplers are designed to collect water when the water surface rises to a selected stage.

These devices are useful mostly for “quick and dirty” site characterization. They can be deployed inexpensively and in great numbers arealy to determine if certain constituents are present and in general terms a concentration of that constituent.

They should not be thought of as a long-term monitoring tool because of no time stamp, manpower intensity, and un-reproducable results.

Single-stage samplers may be the only way to sample in certain situations, but care must be taken not to think of them as a low cost panacea. Used properly, they can be a good screening tool or as a precursor to a long-term monitoring plan.

## 6.0 RESPONSIBLE PERSONNEL

6.1 ER Project Personnel

6.2 Field Team

6.3 Field Team Leader

## 7.0 EQUIPMENT

A checklist of suggested equipment and supplies needed to implement this procedure is provided in Attachment A. Descriptions of commonly used pieces of equipment, their advantages, and their limitations are listed below.

7.1 *Glass or plastic bottles*—either type may be used depending on manufacturer's recommendation.

7.2 *Tubing* —made of different types of material dependent on constituents to be analyzed, and

7.3 *Miscellaneous parts* —as needed contingent on the type of single-stage sampler adopted by the user or recommended by the manufacturer.

## 8.0 PROCEDURE

**Note:** Deviations from SOPs are made in accordance with QP-4.2, Standard Operating Procedure Development and documented in accordance with QP-5.7, Notebook Documentation for Environmental Restoration Techncial Activities.

8.1 Design and Operation

The design of the siphon sampler is similar to that described by the Interagency Committee on Water Resources-Subcomitte on Sedimentation (1961) and by Edwards and Glysson (1988) and shown in Attachment A. The operation of a siphon sampler during an event with increased stage and flow is simple. As the stream stage rises to the elevation of the intake level A (Attachment A), water enters the 1/4-inch-diameter plastic tube. As the stream continues to rise, water continues to move up the intake tube until the stream and the water in the tube reach level B; when the water levels rise past level B, a siphon is created and the sample bottle starts to fill. The sample bottle fills rapidly because the flow rate is driven by the hydraulic head, which is approximately the height difference between the stream stage (level B) and the discharge end of the intake tube (level C). As the water level in the sample bottle reaches the bottom end of the exhaust port (level C), filling is substantially completed; however, a small amount of additional water, equal to the water volume in the exhaust tube between levels C and D, enters the bottle after the water level rises past level C. After the stream stage reaches level D, an airlock is established in the loop of the exhaust tube, which precludes further filling of the bottle. Changes in the water level after this point do not significantly affect the contents in the bottle.

8.2 Installation

Single-stage samplers are installed so that surface water will flow into the prepared bottle. Installation may involve diggin a hole to place the bottle in, placing a bottle at the end of a weir or any othe technique that will allow the bottle to fill with

surface water runoff. In the design that utilizes emplacing the bottle in a hole, the area downstream from the bottle must be built or dammed up (staged) so that water collects or ponds around the inlet tube for the bottle. The bottle and inlet tube in this design must be located below the surface of any ponded water so that flow will be by gravity via the tube and into the bottle.

8.3 Collection

After a storm event, the bottles must be checked for water as soon as possible. If the bottles contain water, they should be immediately removed. The bottles should be immediately capped and placed in a coller if desired constituents require preservation at low temperatures. As part of the records kept on sample collection, a notation should be made on the probable date of the storm event that led to the sample collection. Several samplers can be installed at different levels at each site to collect samples throughout the anticipated range in water levels (see Attachement B).

8.4 Sample Preservation

Sample preservation (filtration, acidification) will depend on the information desried by the user. The user should refer to LANL-ER-SOP-1.02 Sample Container and Preservation. At a minimum, specific conductance and pH should be determined by the user as soon as possible.

## 9.0 REFERENCES

The following documents have been cited within this procedure.

Edwards, T.K. and Glysson, G. D., 1988, Field methods for measurement of fluvial sediment: U.S. Geological Survey Open-File Report 86-531, 118 p.

Inter-Agency Committee on Water Resources, Subcommittee on Sedimentation, 1961, The single-stage sampler for suspended-sediment: Minneapolis, Minnesota, St. Anthony Falls Hydraulics Laboratory, Report 13, 105 p.

QP-2.2, Personnel Orientation and Training

QP-4.2, Standard Operating Procedure Development

ER-SOP-1.02, Sample Container and Preservation

ER-SOP-1.03, Handling, Packaging and Shipping of Samples

ER-SOP-1.04, Sample Control and Field Documentation

## 10.0 RECORDS

The **Focus Area Leader** is responsible for submitting the following records (processed in accordance with QP-4.4, Record Transmittal to the Records Processing Facility) to the Records Processing Facility.

10.1 Data collection records

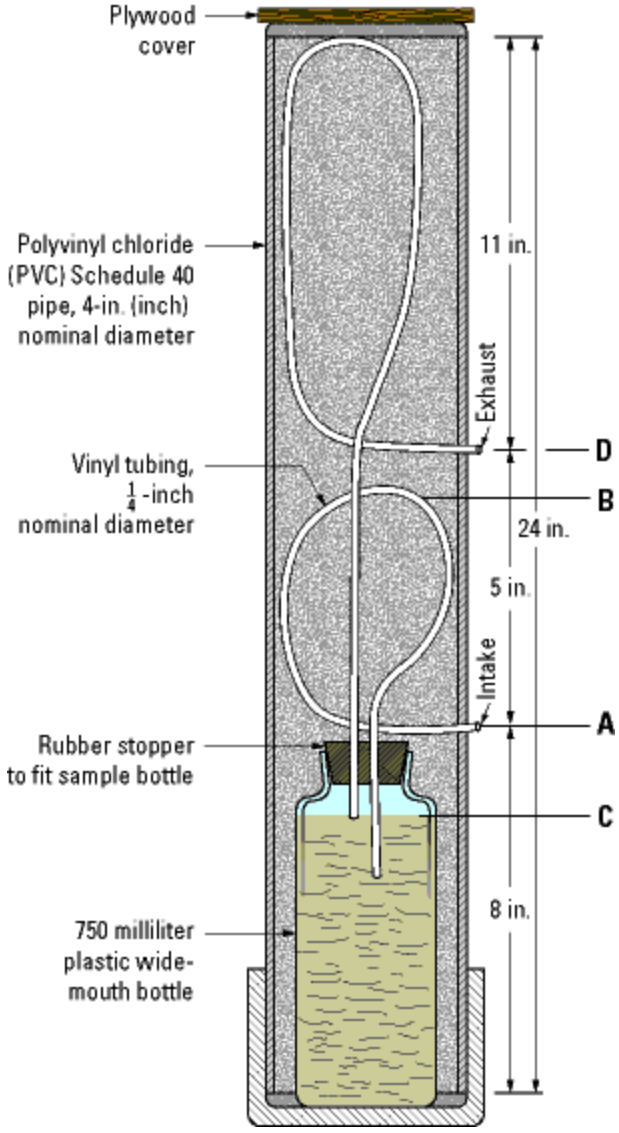
10.2 Analytical results

## 11.0 ATTACHMENTS

The document user may employ documentation formats different from those attached to/named in this procedure—as long as the substituted formats in use provide, as a minimum, the information required in the official forms developed by the procedure.

Attachment A: Typical Siphon Sampler (1 page)

Attachment B: Typical Stream-Site Installation of Siphon Samplers




**Example of a Typical Siphon Sampler**

## Typical Stream-Site Installation of Siphon Samplers